

The winter of 1863-64 was severely cold. An Army train crossed White River on the ice at Jacksonport, and even in the southern part of the State, Washington, Hempstead County, the temperature was as low as 6° F. The early spring of 1864 was favorable, but cold weather about the middle of March damaged fruit. A fair corn and wheat crop was made.

In 1866 the spring was promising except too wet for cotton. Corn and vegetables were fine to begin with, but the wet weather continued so late into the summer that the crops in the bottoms were drowned out and in the hills were washed away. In the late summer and fall dry weather did further damage. The rivers were high most of the spring and early summer, but there was no general overflow.

The spring of 1867 was cold and wet, snow, sleet, and hail falling at Little Rock as late as the 5th of March. Owing to the wet weather crops were late and very grassy; but dry weather came in time to clean them, and an excellent corn and cotton crop was made. The fall was dry. The first bale of cotton was marketed the 24th of September, about a month later than the average date. The weather continued warm, with occasional temperatures as high as 80° F. until the middle of December, but the last week of the year it was severely cold, with plenty of sleet and snow on the ground.

The year 1868 was favorable and an excellent crop was made in most sections of the State. A wet fall was unfavorable for cotton picking. Winter did not set in until after Christmas.

The spring and summer of 1869 were average, but the fall was very dry and the Arkansas too low for navigation.

January, 1870, was a very pleasant month, more like autumn than winter, but the latter part of February was cold, the temperature at one time being 10° F., and the first 20 days of March were very cold. Spring was late, with snow on the ground Easter, April 16, 1870. After the spring rains the weather was dry and favorable for farm operations, and the best crop made since the war was harvested in the fall.

The winter of 1870-71 was not severely cold, but cool weather continued until in May; so the season was backward and some damage was done to wheat; but the year 1871 as a whole was favorable and a good crop was made.

The spring of 1872 was again backward. Cotton was not all planted until June, the result being that an increased acreage was given to corn. High water also delayed planting in the low lands. In May a terrific hailstorm was reported in Jefferson County, but other unfavorable conditions had prevented much headway being made with crops, so the damage was lighter than it would have been under normal conditions. As the season advanced conditions became more favorable and a fair crop was made, corn being good, and cotton being estimated at three-fourths a normal crop.

Of the winter 1872-73 little information was obtained, but the spring of 1873 was wet, and farmers were considerably behind with their work the middle of June. Wet weather continued and some cotton was never cleaned. Oats and pastures were good. Cotton was short, but the grain crops were sufficient for home consumption.

The year 1874 was unmarked, conditions being about average and a fair crop was harvested.

From 1875 to July, 1879, little definite information was obtained. There seemed to be nothing of marked importance, the weather being about normal and crops average, with no disastrous floods.

The Weather Bureau records starts the 1st of July, 1879, and thereafter the record is complete.

#### CONCLUSION.

It must not be inferred from this paper that Arkansas's climatic history is a record of floods, freezes, and droughts for those were events out of the ordinary and as such attracted attention and were mentioned in the newspapers, while of the average year little was said for abundant harvests and delightful seasons were not out of the ordinary.

Arkansas has an annual rainfall of 48 inches properly distributed for agricultural purposes, a growing season ranging from 169 days in the extreme northwest to 241 in the southern counties, permitting of the growing of two or more crops each year, heavy spring rains, warm summers, and long dry autumns. Situated as we are, far enough south to escape the prolonged and bitter cold of the northern winter, far enough north to avoid the scorching sun of a tropical summer, Arkansas's climate is admirable for a diversified agricultural State.

#### HAILSTORM AT LEHI, UTAH.

A hailstorm of unusual severity occurred at Lehi, northern Utah County, Utah, on August 9, 1920, from about 4:30 p. m. to 4:50 p. m., which, owing to the density of the population affected, was undoubtedly the most destructive hailstorm of record in the State. Other storms have deposited as much hail, and as large hailstones, within the State, but none has been so destructive of property.

The hailfall accompanied a moderate rain and thunder storm which passed over the city from Cedar Valley to the Wasatch Mountains, from which rain fell a few miles in all directions around Lehi, and a considerable amount of hail fell on the higher portion of the adjacent mountains. The path marked by the most destructive hail was about 1 mile wide and 2 miles long, extending in a northwest-southeast direction across the northern portion of Lehi city. An area about  $\frac{3}{4}$  by  $1\frac{1}{4}$  miles was well covered by intense hailfall, some local accumulations being a few inches deep.

The stones were unusually large, ranging from the size of large marbles to hens' eggs, the average size in a miscellaneous collection taken from the top of a drift after the storm being about 4 inches in circumference, though many were found to be from 5 to  $6\frac{1}{2}$  inches in circumference. They were mostly of a roughly spherical form, though many were flattened, elongated, or otherwise distorted. (Figs. 2 and 3.) Large numbers of the hailstones were broken by the impact of falling, and were found to have from 6 to 10 concentric layers of opaque and transparent snow and ice, covering a pellet of ice from a quarter to a half inch in diameter. At the Cooperative Weather Station (at the postoffice) 0.60 inch of precipitation was measured, about one-half of which was from melted hail. One stone picked up near the rain-gage after the storm was  $6\frac{1}{2}$  inches in circumference, though the station is slightly to one side of the path of greatest destruction.

The destruction of fruit, truck, gardens, potatoes, sugar beets, corn, unharvested grain, alfalfa and other crops was very great within the limited area mentioned, little being left worth harvesting excepting the tubers. Hundreds of chickens and some rabbits perished before they could reach shelter, and numerous horses and cattle, as well as several persons caught without shelter during the storm, suffered more or less bodily injury. Runaway teams destroyed considerable property about the city and in the adjacent agricultural fields, and composition roofs and automobile tops were riddled by the hailfall. Practically all the north windows within the central area of the storm and many of the west windows were broken; and the large greenhouses of the Lehi Floral Co., with their contents, were almost totally destroyed with the breaking of about 7,000 roof glass. (Fig. 3.) The total loss was estimated by Mr. Joseph Anderson, the cooperative weather observer, at about \$50,000.—*J. Cecil Alter*, Meteorologist, Salt Lake City, Utah.

#### LIGHTNING PHOTOGRAPHS.

Mr. J. W. Stjernstedt, manager of the Pacific coast office of the American Transmarine Co. (Inc.), has furnished the Weather Bureau with two lightning photographs. These pictures were taken about 10 p. m. at Jamaica, Long Island, July 12, 1919. The storm was approaching from the east or northeast. Both pictures were made with a small kodak, using the F:45 stop. The two diagonal lines seen on fig. 1 J. W. S. near the upper left and lower right hand corners are defects in the negative. The white spots in the same picture are caused by falling raindrops illuminated by the lightning flash. Fig. 2 J. W. S. shows five successive flashes almost parallel; this is due to the wind movement, which carried forward the air through which the lightning was discharging.—*C. L. M.*

#### LIGHTNING INJURY IN A POTATO FIELD.

Articles have appeared from time to time in botanical literature describing lightning injury to plants. Such injuries to trees are of course quite common, but occasionally herbaceous plants growing in a level field are injured. The injured plants usually cover a more or less circular area of 10 to 30 feet in diameter.

A heavy electric storm occurred at College Park, Md., on August 9, between 6 and 6.30 p. m. A few days after this storm Mr. T. H. White, of the Agricultural Experiment Station, called the writer's attention to an area in one of his experimental potato plots that had apparently been struck by lightning. On the day following the storm the plants in this area were lying on the ground in a wilted condition, with stems somewhat twisted just above ground. This injured area of approximately 30 feet in diameter was staked off and no increase in its size has since been found. A 10-foot strip of grass separated this plot from an adjacent one and was partly included in the circular area, but no injury to the grass was noticed, although a few potato plants in the adjoining plot and just within the circular area were slightly injured. Fig. 1 E. S. J. (on plate opposite) was obtained 16 days after the storm and shows the area containing the dead plants.

All the conditions of the injury and the circumstances under which it occurred seem to be in good agreement,

with the following explanation given by Jones and Gilbert:<sup>1</sup>

"When an electric storm breaks suddenly following a period of dry weather and the first rain wets the top soil, there remains a layer of dry earth between this wet surface and the moist soil underneath, which is a poor conductor of electricity. When the lightning strikes the wet surface soil it disperses in all directions, horizontally and then downward into the earth, following lines of least resistance. The plant stems and roots with their abundant water content are better conductors than the layer of dry soil just mentioned, and so the electric current passes through them. The tissues may thus be variously injured or killed, depending upon the amount of current passing through them. The strength of the current, of course, diminishes the farther it gets from the center of the affected spot, and consequently the lessened injury at the margins of the area."—*Earl S. Johnston*, Agricultural Experiment Station, University of Maryland.

#### STANDING WHEAT FIRED BY LIGHTNING.

On July 16, 1920, a field of standing wheat belonging to R. H. McKean and W. B. Rice, near Wasco, in Sherman County, Oreg., was set on fire by lightning, and about 200 acres were burned over. From such information as can be obtained it appears that the lightning struck in the open field, no buildings, trees, or fences being near. The storm was accompanied by high wind for a few minutes, and light rain fell. At Wasco, the nearest cooperative meteorological station, the rainfall on that date amounted to 0.10 inch.

While fires in ripe standing grain are very common in this section, the firing of standing grain by lightning direct is very unusual.—*Edward L. Wells*.

#### LIGHTNING AND FOREST FIRES.

Though forest fires caused by lightning are of frequent occurrence in California, the summer of 1920 will be recorded as one of the most disastrous in history. These summer thunderstorms are usually limited to the elevated portions of the State, which are densely forested. Lightning discharges are particularly dangerous, because, unlike eastern thunderstorms, these storms are usually accompanied by little or no rainfall, which might extinguish a fire once started.

The Forest Service announced that lightning caused 60 forest fires in northern California during the first five days of July. Again, as a result of a series of extremely violent thunderstorms which passed over the same region on August 4, approximately 240 forest fires were caused by lightning, according to the Forest Service. Again, on August 6, 35 forest fires were started by lightning in a single thunderstorm in the vicinity of Sisson, near Mount Shasta. During this storm lightning struck the forest lookout station on the summit of Mount Eddy, seriously injuring the ranger on duty there, and the lookout station was destroyed in the fire which followed. During the second week of August there were 7 extensive forest fires beyond control in northern California as a direct result of these storms. The forest-fire situation in northern California was the worst in four years. Because of deficient precipitation during the past rainy season, the forest floor was extremely dry, and fires spread with

<sup>1</sup> Jones, L. R., and W. W. Gilbert. Lightning injury to herbaceous plants. *Phytopathology* 8:270-282. 1918.